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to the Arctic coast of Alaska. The earliest birds were noted at Point Barrow May 15, 1882, and May 25, 1883. But already by this date the species has appeared on the Mackenzie near the mouth of the Liard. By what route do these birds reach their destination? They do not come from the south, for the species is unknown in southern Canada at any time of the year. The nearest part of the Pacific Ocean is to the southwest near Sitka, but the birds do not come by that route, for the birds of this part of the country have been closely watched for several years, and the only spring record of the Yellow-billed Loon is that of a straggler seen on Admiralty Island May 25, 1911.

They do not come up the valley of the Yukon, for this species is not known anywhere in the interior of Alaska. The only possibility left is that they come from the Arctic Ocean to the northward. But all the lakes between Great Slave Lake and the Arctic Ocean are still covered with ice and so is the delta of the Mackenzie River. Thus apparently the only solution of the problem is a migration at a single flight from the open waters of the Arctic Ocean across 700 miles of frozen country to the open water near Great Slave Lake. This supposition also requires that the birds pass Point Barrow off-shore many days before they were noted at that place. Thus the spring route from eastern Asia would be first a 2000 mile trip *northeast* to Bering Strait, then 500 miles still *northeast* to round Point Barrow, then 500 miles east to the coast of Mackenzie, and then finally 700 miles *south*—in the spring—to Great Slave Lake. Truly a most remarkable route, but who will suggest a route more plausible?

The route is apparently reversed in the fall. The species is common on Great Slave Lake until the middle of September, and Sir John Franklin says that near there at Fort Enterprise this species was the last water bird to leave, October 26, 1820. By this time the smaller lakes and streams were closed by the ice, but there would still remain enough open water in the larger lakes and the Mackenzie River for the birds to work their way *north* in the early winter the 700 miles to the open Polar Sea. Then there would still remain a 3000 mile trip to their winter home and they would be passing Point Barrow in November weeks after the last of the birds which nested there had disappeared, for the latest fall date at this place is September 25, 1897. And so this article closes with a reiteration of the opening paragraph: The migration route of the Yellow-billed Loons which visit Great Slave Lake is the most incomprehensible problem of migration on the North American continent.

Washington, D. C., August 18, 1915.

NOTES ON THE NESTING OF THE WHITE-TAILED PTARMIGAN IN COLORADO

By W. C. BRADBURY

WITH FIVE PHOTOS

ON MAY 7th of this year (1915) I sent out a party of four young men, with team, camera, camping outfit and equipment, for the purpose of collecting the rarer varieties of eggs and birds nesting at high altitudes, this in the interests of the Colorado Museum of Natural History, Denver. Commencing at the foot-hills near Morrison, Colorado (altitude 5750 feet above sea-

level), the party worked steadily upward until they reached, on June 10, St. Mary's Lake, a small body of water at the foot of a glacier in Clear Creek County (altitude about 10,800 feet). Here camp was located to allow of hunting for the White-tailed Ptarmigan (*Lagopus leucurus*), Leucosticte, Pipit, and other species nesting at and above timber-line (at this point, about 11,000 feet altitude), and for the Kinglet, Hermit Thrush, and other species nesting shortly below timber-line. The party spent several days, prior to my arrival there on June 20, in a fruitless search for nests of the ptarmigan, although daily seeing more or less of the birds.

Owing to this location being adjacent to some of the oldest mining centers in the state, the birds are scarce; but mining friends having reported seeing a few months previously several flocks in the full white winter plumage, I selected this site for work. This was desirable also on account of accessibility, we being

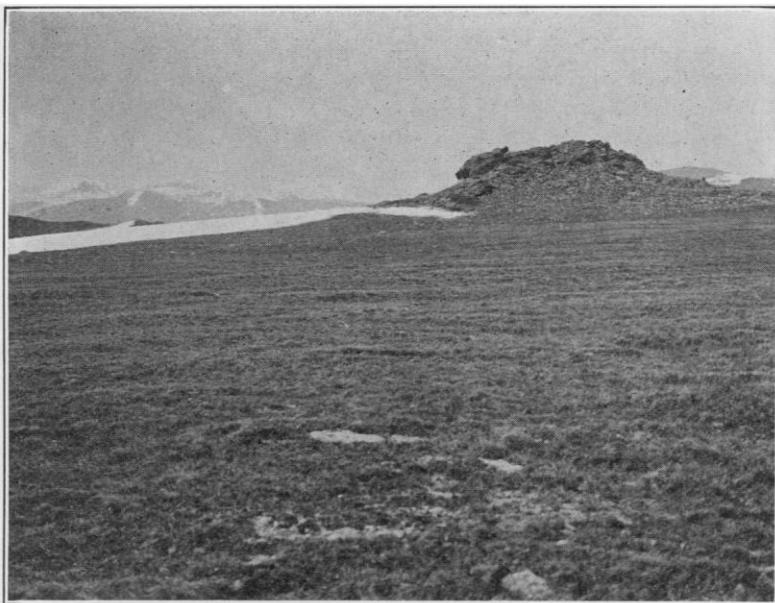


Fig. 71. NESTING GROUND OF WHITE-TAILED PTARMIGAN, AT 11500 FEET ALTITUDE IN CLEAR CREEK COUNTY, COLORADO; NEST AND EGGS TAKEN NEAR HERE JUNE 26, 1915. ROCK-PILE IN BACKGROUND FREQUENTED BY BROWN-CAPPED ROSY FINCHES.

able to get by wagon nearly to the camp site above referred to.

Immediately upon my arrival we devoted our entire attention to search for ptarmigan nests, as neither our museum nor myself had a representation of the eggs of this species. As these birds do not nest in this state below timber-line, our easiest approach to their nesting grounds was by foot up a glacier approximately a mile long, which landed us upon a wide expanse of comparatively flat, rolling ground, terminating at the base of James Peak and Mount Bancroft, and covered with the short grass and other scrubby plant growth peculiar to that altitude. Much of this tract was still covered with snow, and the balance mostly wet and sloppy from the melting drifts, thus making it necessary to wear rubber or other water-proof boots.

Being but little conversant with the nesting habits of these birds, we nat-

urally first directed our search to the sloping hillsides from which the snow had vanished. The ground here was comparatively dry and well covered in places with large and small boulders, and with better grass and vegetable covering for nest sites.

The first day we saw seven ptarmigan, three pairs and a single cock. We searched diligently for their nests until about three P. M., when we repaired to a large pile of jagged rocks and boulders standing out in the open ground, altitude about 11,700 feet (see fig. 71), where on two previous occasions my assistants had seen a pair of Brown-capped Rosy Finches (*Leucosticte australis*) and had spent an hour or two each time in unsuccessful waiting, watching and searching for their nest. Finding the male bird present and the female shortly appearing, I decided to make another thorough search, which we did, scattering



Fig. 72. MALE WHITE-TAILED PTARMIGAN PHOTOGRAPHED NEAR THE NEST, JUNE 21, 1915.

our forces systematically, and as thoroughly as possible investigating the openings, with flash-lights and otherwise, for a couple of hours, but with no better results.

On our arrival there we noticed a pair of ptarmigan not over forty to fifty yards from us in the open, paddling around in the wet sloppy grass and water, and I told my associates to keep an occasional eye on them while we completed our leucosticte search. This being finished we turned our attention to the ptarmigan, which had not moved over fifty feet during the two hours, but only the cock was in sight. We all scattered out in search for the hen, devoting our attention mostly to the adjacent comparatively dry spots. We knew she had not flown and yet we were unable to locate her. This was aggravating, and we

came together for a conference; and while discussing the matter Olson broke out laughing and pointed down to the ground, where, within six feet of me and not ten feet distant from any one of us, was the bird resting down flat in the grass. I supposed she was simply crouching and hiding, as I had seen them do before, there being nothing to suggest a nest. Telling the boys to stand still where they were, I approached her cautiously from behind and inserted my hand beneath her, at which she ruffled, scolded, turned her head and pecked my hand several times. Raising her sufficiently from the nest to look beneath I discovered two eggs lying there in water. I then let her gently back on to the nest, she still clucking and pecking at me, my hand being wet from contact with her.

It being wet, sloppy ground all about, water in the nest, and melting snow within fifteen or twenty feet, the conditions surprised me, and I remarked to the boys that, barring the altitude, it was more suitable ground for the nest of a grebe or Black Tern than for a ptarmigan. I then had Durand prepare his camera and photograph her on the nest (see fig. 73). I then lifted her, on my hand, out of the nest and placed her down within a foot of it, she still scolding and pecking my hand, and he again photographed her and nest (see fig. 74, showing the eggs lying in about a half-inch of snow water). He then photographed the cock (see fig. 72), which was and had been during all this time not over twenty feet distant from us and the hen and nest. We then left the birds, and repaired to camp some one and a half miles distant, hunting over the bare ground en route, with no other results than a couple of pipit nests.

The next morning, June 22, we were off at seven o'clock, with lunches, glasses, etc., taking no camera, as Durand had previous to my arrival secured a good series of ptarmigan photos, covering the same ground as on the previous day, with much additional territory, but, though we located some six or eight pairs of ptarmigan and two single cocks, we failed to discover another nest.

On our return trip, we visited the site of yesterday's find and, though the ptarmigan were not in sight, I told the boys to watch for the leucosticte while I inspected the ptarmigan nest, which I had yesterday marked carefully with a small pile of stones on a flat rock, with a tag marked "15 feet due west." Notwithstanding this, a five minutes search did not reveal the nest, at which I called the boys down. They came, laughing, to where I was and stood looking in amazement for a moment, when Olson said "Why, it was right beside that stone your foot is on!" A closer search with the aid of the fingers revealed the nest, lightly covered with dead grass that obscured the eggs, and looking exactly similar to, and indistinguishable from, a dozen other barren spots the size of one's hand, or larger, over which the wind had blown a light fluffy deposit of dead grass. An examination disclosed the two eggs, only, still lying about half submerged in snow water. Leaving the cover as nearly as possible as found, we departed for camp.

On the way to camp, I decided on the following plan, which I unfolded to the boys after supper and instructed them to carry out the next morning. Each was to roll up some of his bedding and canvas for sleeping purposes and take sufficient food for four meals, together with such other appliances necessary (omitting cameras and other heavy stuff) to prepare him for stopping over night; leave the glacier about two-thirds the way up, for the first promising ground, then scatter out and, as soon as a bird or pair of birds were found, Durand, who was in charge, should leave Olson with the bird or birds and have him not lose sight of them under any circumstances until it was too dark for him to see; then he should camp right there with the bird or birds until morning

and at dawn relocate them before breakfasting, and continue that careful watch until the following night, unless in the mean time he tracked the female bird to the nest. Durand and the other man, Barton, were to pursue exactly the same tactics when they located further birds.

This plan was followed out on Wednesday, June 23, but being personally under the weather that day I did not accompany them, but promised to and did follow them up the next morning. The results were as follows: In the morning near the head of the glacier they first found a cock bird in approximately the same spot we had once before seen him, and, on another occasion, had seen a pair together but had failed to find their nest. Durand, feeling somewhat irritated at this, deviated from my instructions to leave one man, to the extent of all three of them stopping, unloading their outfits, receding a hundred or so yards and there separating fifteen or twenty feet apart and thoroughly combing the ground again well up the slope of the comparatively steep hill on one side, which was bare of snow, down to the glacier on the other side and continuing this for approximately two hundred yards up the gulch beyond



Fig. 73. FEMALE WHITE-TAILED PTARMIGAN UPON HER NEST; PHOTOGRAPHED JUNE 21, 1915.

where the male bird was discovered and still remained; this, however, without results. They then came together to discuss further methods and while so doing, as on the previous occasion, one of them pointed down to the female bird, within six or eight feet of where they stood, on the nest, and upon raising her by inserting the hand beneath her from behind disclosed five eggs. This nest, located alongside a jagged rock about two feet high, was but a bare pretense for one, with just a trifle of dry grass and six or eight feathers of the bird in the bottom, and a small bunch of dry grass pushed to one side, with which to cover the eggs when she left them. The bird was replaced and left on the nest.

On following the party up next morning, I first found Olson, about a mile beyond the nest just described, lying on his blankets and watching a pair of ptarmigan which he had located about noon of the previous day and camped with as instructed. After lying down and talking with him awhile, he having told me of seeing, while watching the pair, several ptarmigan fly across a gulch below him just before dark the previous evening and also shortly after daylight

that morning, I instructed him to go and prospect that gulch, which we had not previously worked, and I would stand watch on his birds. This I did for about two hours, during which time they were never more than twenty-five to forty yards from me. I carefully avoided going near enough to disturb them and they did not move out of a radius of more than twenty yards, occasionally moving around very slowly, picking buds from small scrub bushes a foot to eighteen inches in height, then lying down just behind a rock or under the edge of a bush, generally on the opposite side from me. At times I carefully walked around to make sure they had not sneaked off, and found them crouched down apparently asleep or resting. Finally they slowly walked over a very slight rise in the ground, about forty yards distant, and disappeared. Immediately



Fig. 74. THE WHITE-TAILED PTARMIGAN SHOWN IN PRECEDING
PICTURE HAS BEEN LIFTED FROM HER NEST BY HAND, DIS-
CLOSING THE TWO EGGS LYING IN HALF AN INCH OF SNOW
WATER; PHOTOGRAPHED JUNE 21, 1915.

leaving my blankets I deliberately walked over to ensure not losing sight of them, but, although they had not been out of my sight two minutes, was unable to find them. I unavailingly scoured the ground for a half hour. I know absolutely that they did not fly; there was no shelter for them except the very slight ridge that extended up for one or two hundred feet, and an occasional small patch of from one to four or five square yards of the short bush referred to, and a few projecting rocks, all of which were thoroughly prospected.

About this time Olson returned and joined me in the search, but we found no sign of the birds. He then told me that in the case of the first pair he located and camped with the previous day, after finding the nest with the five eggs, he had had exactly the same experience, except that after they disappeared he

hurried to get in sight of them again and saw them streaking it out, running like a pair of wild turkeys, until seeing him when they took wing.

The next pair of birds was located by Durand and Barton near Stuart Lake, a small artificial reservoir in a cañon at the head of a fork of Fall River (altitude 11,400 feet), on rough rocky ground. This pair we had seen in the same place before.

The following are extracts from Barton's notes: "Located birds about 2 P. M. near patch of bushes, and I sat down near by; they paid no attention; would sit down awhile and then feed, scratching about roots, grass and plants. Hen paid little attention, but cock, generally between me and hen, always on lookout and occasionally flew short distance, soon returning; both birds would at times lie down in puddles of snow water and pant with heat, while I was cold. About dusk (8 o'clock) they were more restless. At daylight next morning they were where I left them at dusk the night previous. Started feeding about 9 o'clock and would feed up to within a few feet of where I lay on rock. While eating lunch, and at other times when lying down, threw scraps of bread to them, which they would pick up and eat, at times within a few feet of my feet. At times cock would reply to calls of another cock on hillside; at other times would not answer. Was with them until I had to start for camp, about 4 P. M., during which time, since located at noon of day previous, they had moved in radius of only a hundred or two feet."

A third pair of birds was located by Durand about 2:30 o'clock on a small knoll a short distance up the cañon above Barton, and I quote from Durand's notes regarding the same: "After locating birds, having left my blankets and outfit with Olson, I went back a mile and a half and got them, returning at about 3:30 o'clock. Found the birds just where I left them. Although I was chilly, the birds were sitting about panting, occasionally crawling or slowly moving about. Toward evening birds began feeding. I had to build a fire to keep warm. About 7:45 o'clock (nearly dark) they seemed more restless and suddenly started to run (didn't believe it possible they could run so fast) up steep bank of snow, to wall of rocks where they disappeared. Next morning they were back to foot of snow bank. Watched them until 4 o'clock P. M.; behaved same as day before. No nest."

On returning to camp we visited the nest discovered Monday with two eggs in it, and it now contained four; we also visited the nest found on Wednesday and it now contained seven eggs; both birds being on the nests, they were raised by hand sufficiently for the purpose of inspection and then left undisturbed.

The following day, Friday, we did not visit the ptarmigan ground, but went to an opposite ridge at a lower altitude in search of Kinglet, Hermit Thrush and other nests located, in course of construction or with incomplete clutches, about a week previous, and of such other specimens as we might find.

The next day, Saturday, we repaired again to the ptarmigan ground, first visiting the site of the nest left with the seven eggs in it, only to find the bird and eggs gone. I at first charged it up to either a fox or weasel, but upon second thought had to abandon that idea, there being about the nest no signs of broken eggs, nor parts of egg shells, nor any feathers indicating that the bird had been eaten or in a struggle. A further examination disclosed the tracks of two men, who had come up the glacier the day previous, leaving the same at an angle heading directly for the nest, which was not over thirty feet distant from the edge of

the snow and their tracks in it. I did not know who they were, but could they have heard my remarks regarding them, we should doubtless have become much better acquainted.

From here we proceeded, in a disgusted mood, to the other nest in which we had left four eggs, and finding the bird on the nest, presumably laying an egg, left it undisturbed. Returning toward evening, after a further fruitless search, I found the bird still on the nest, and after thinking the matter over and deciding that I might, between foxes, weasels and bipeds, lose that set also, I took both the bird and the eggs (now five) from the nest, which was now nearly dry.

In preparing the skin of the bird that evening, we carefully examined the

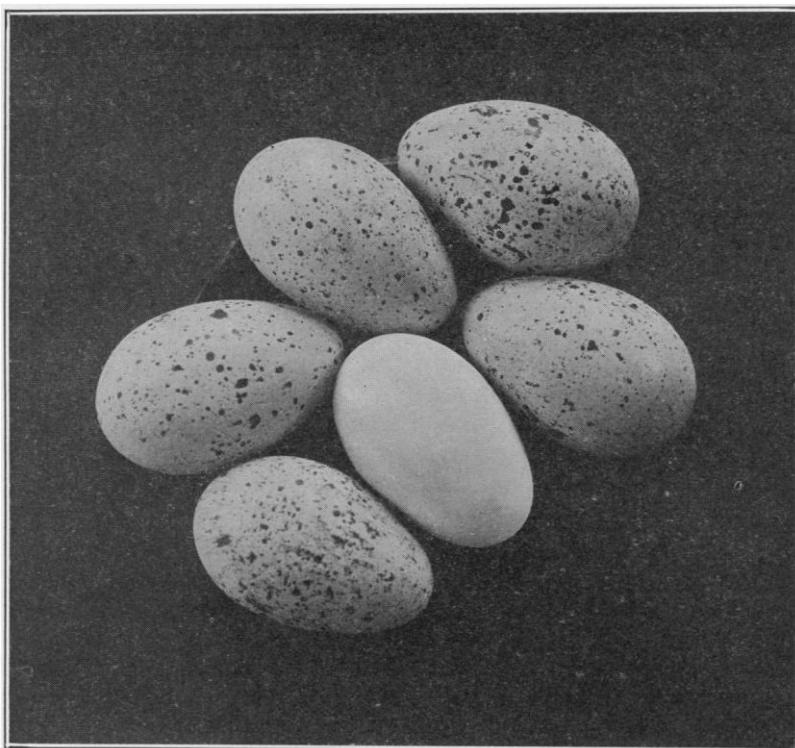


Fig. 75. EGGS OF WHITE-TAILED PTARMIGAN, THE FIVE SPOTTED ONES TAKEN FROM THE NEST, THE UNMARKED ONE FROM THE OVIDUCT OF THE BIRD CAPTURED ON THE NEST.

ovary and oviduct which contained six eggs ranging from the size of a bean to practically a full sized egg.

The measurements in inches of the five eggs taken from the nest were: 1.73x1.15, 1.72x1.15, 1.72x1.13, 1.75x1.13, 1.72x1.15.

The measurements of the egg taken from the oviduct were slightly less, being 1.70x1.10, with no perceptible difference in thickness or firmness of shell; but what impressed me as unusual was the fact that this egg was pure white, with no indication of any markings whatever, whereas the five eggs taken from the nest, notwithstanding the fact that much of the time they had been partly immersed in water, some of them for nearly a week, were all uniformly and nor-

mally marked (see fig. 75). This raised the question in my mind as to when and at what stage the pigment is deposited on the shell, and I would be pleased to be enlightened by some one more versed in the matter than myself.

The bird had deposited only three eggs in the nest during a period of five days, and either it was on the nest at the time taken, for the purpose of depositing this white egg, or else resting after having laid her fifth egg; in the latter case she had laid but one egg in three days.

The only other records I have of nesting dates of this species are those of Carter (deceased) of Breckenridge, Colorado, and are as follows: June 17, 6 eggs; June 27, 5 eggs; July 2, 6 eggs; July 6, 6 eggs.

Although more or less familiar with these birds for the past thirty years (though I never before searched for their nests), I never saw one run or move on ground faster than a turtle, or before heard of it.

I am convinced the finding of a nest, unless the bird is on it, would be pure accident. That if they build, or line, any systematic nest it is done as with many species of ducks, i. e., while they are laying their clutch and during the incubation of same.

The moulting of the females was much farther advanced than that of the males. The males always appeared more on the alert than the females (compare the photos). The moulting had made marked advancement between June 11 and 21.

Having always considered the ptarmigan the champion fool of all land birds, relying almost solely on its protective coloration and slow movements for safety, it maintained this reputation with me in all the preliminaries of this trip, but when it came to the finals in matters of nidification and the perpetuation of its species it created an admiration for its tact and ability in outwitting us in fine shape; but I am in hopes of getting the resultant grouch out of my system during the next nesting season.

Being taken seriously ill on Sunday, I had to be quickly removed to a lower altitude for treatment, and on instructions the boys broke camp and followed me the next day.

Denver, Colorado, October 12, 1915.

CHARACTERISTIC BIRDS OF THE DAKOTA PRAIRIES

II. ALONG THE LAKE BORDERS

By FLORENCE MERRIAM BAILEY

THE BIRDS of the prairie region include not only those of the open grass-land, such as Prairie Chickens, Upland Plover, Short-eared Owls, and Bobolinks, but also those of the brush patches and timbered borders of the numerous prairie lakes, together with those that frequent the sloughs and marshes and the lakes themselves.

The Stump Lake wheat farm where I spent part of the summer was east of the hundredth meridian, but its proximity to the arid regions was attested by the alkaline water of the lake and lines of frothy suds along its shores, while partly buried but well preserved bones of buffalo that had come to water from the surrounding prairie were to be picked up along the beaches. In the first